State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

M e m o r a n d u m

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Information Item

From: CINDY McKIM
Chief Financial Officer

Prepared by: Ross A. Chittenden
Division Chief
Transportation Programming

Subject: **OVERVIEW OF THE STATE HIGHWAY OPERATIONS AND PROTECTION PROGRAM**

SUMMARY:

The Department of Transportation (Department) is presenting this overview on the State Highway Operations and Protection Program (SHOPP) for information. The attached report and appendix detail the background, purpose, structure, system condition and operational demands, and challenges and opportunities of the SHOPP.

This information item provides the foundation for more detailed presentations planned for the December 2006 California Transportation Commission (Commission) meeting on funding opportunities and priorities within the SHOPP.

Both this item and planned future items will provide the Commission with essential information needed for review and comment on the 2007 Ten-Year SHOPP Plan, which will be transmitted to the Commission in January 2007.

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OVERVIEW OF THE STATE HIGHWAY OPERATIONS AND PROTECTION PROGRAM

November 2006

OVERVIEW OF THE STATE HIGHWAY OPERATIONS AND PROTECTION PROGRAM

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SUMMARY:

The Department of Transportation (Department) develops and manages the State Highway Operations and Protection Program (SHOPP) as authorized in Government Code Section 14526.5, Streets and Highways Code Section 164.6, and the Department's Policy for Management of the SHOPP. This overview provides information regarding the SHOPP background and purpose, the structure, the system condition, and operational demands. The information provided also addresses several of the funding challenges and opportunities that will be addressed at the December 2006 California Transportation Commission (Commission) meeting.

BACKGROUND and PURPOSE:

The purpose of the SHOPP is to maintain and preserve the investment in the California State Highway System (SHS) and its supporting infrastructure. Capital improvements programmed in the SHOPP are limited to maintenance, safety and rehabilitation of the transportation infrastructure projects that do not expand the system capacity

As illustrated in the figure below, the Department prepares a Ten-Year State Highway Operation and Protection Plan (Plan) every two years, as required by Streets and Highways Code Section 164.6. The Plan is submitted to the Commission in January of each odd-number year. The Plan provides input for the funding distribution in the Fund Estimate (FE), adopted by the Commission in August of each odd-numbered year. The Commission, through the FE, establishes the framework for how much SHOPP work can be accomplished in the following four year SHOPP programming document. The cycle is repeated every two years, and the SHOPP programming document is updated, taking into account updated ten-year needs and available funding.

The California SHS, an asset worth in excess of $300 billion, includes over 50,000 lane-miles of pavement, 12,500 bridges, 205,000 culverts and drainage facilities, roadside rests and many acres of roadside vegetation and landscaping. Also included in the transportation infrastructure are the

additional support facilities including maintenance stations, equipment shops and transportation laboratories. Much of this system was built in the 1950s, 60s, and early 70s to serve the growing population and economy of the state. Many of the transportation infrastructure assets are now reaching an age where deterioration occurs at a faster rate.

STRUCTURE:

The SHOPP has eight categories: Emergency Response, Collision Reduction, Legal and Regulatory Mandates, Bridge Preservation, Roadway Preservation, Mobility Improvement, Roadside Improvement, and Facility Improvement. The following is a general description of each category. A detailed description of each element is included in the appendix.

- Emergency Response: The goal of the emergency response category is to respond to earthquakes, floods, fires, and other emergencies to restore the roadway to full service within 180 days after major damage and full restoration to pre-disaster conditions within three-years. Emergency response projects resulting from a federally-declared disaster are eligible for federal reimbursement.

- Collision Reduction: The goal of the collision reduction category is to reduce the number of fatal and injury collisions.

- Legal and Regulatory Mandates: The goal of the legal and regulatory mandates category is to comply with state and federal laws and regulations such as the Americans with Disabilities Act (ADA), hazardous waste remediation, and evolving storm water requirements.

- Bridge Preservation: The goal of the bridge preservation category is to prevent catastrophic bridge failures and to provide for the periodic rehabilitation of the 12,500 bridges on the SHS.

- Roadway Preservation: The goal of the roadway preservation category is to keep the distressed roadway lane miles at a steady managed state . The historic goal of the Department has been to reduce the number of distressed lane-miles of pavement to 5,500, or approximately 10 percent of the total system. Due to funding constraints, the Department is reevaluating this goal.

- Mobility Improvement: The goal of the mobility improvement category is to reduce congestion and restore productivity of the SHS. Mobility improvements include operational improvements, transportation management systems, weigh stations and weigh-in-motion facilities. As stated in Section 13 of the adopted 2006 State Transportation Improvement Program (STIP) Guidelines, state highway operational improvements that do not expand the design capacity of the system and are intended to address spot congestion are eligible for SHOPP. Regions may nominate these types of projects in their Regional Transportation Improvement Program (RTIP) if timely implementation through the SHOPP is not possible.

- Roadside Improvement: The goal of the roadside improvement category is to reduce the long-term maintenance costs of roadside infrastructure, improve worker and traveler safety, reduce deficient landscaping, and comply with ADA and California Occupational Safety and Health Administration (Cal/OSHA) mandates at rest areas.

- Facility Improvement: The goal of the facility improvement category is to address worker safety, ADA and Cal-OSHA requirements, and to improve operational efficiency. The facility improvement category includes equipment facilities, maintenance facilities, office buildings, and materials laboratories.

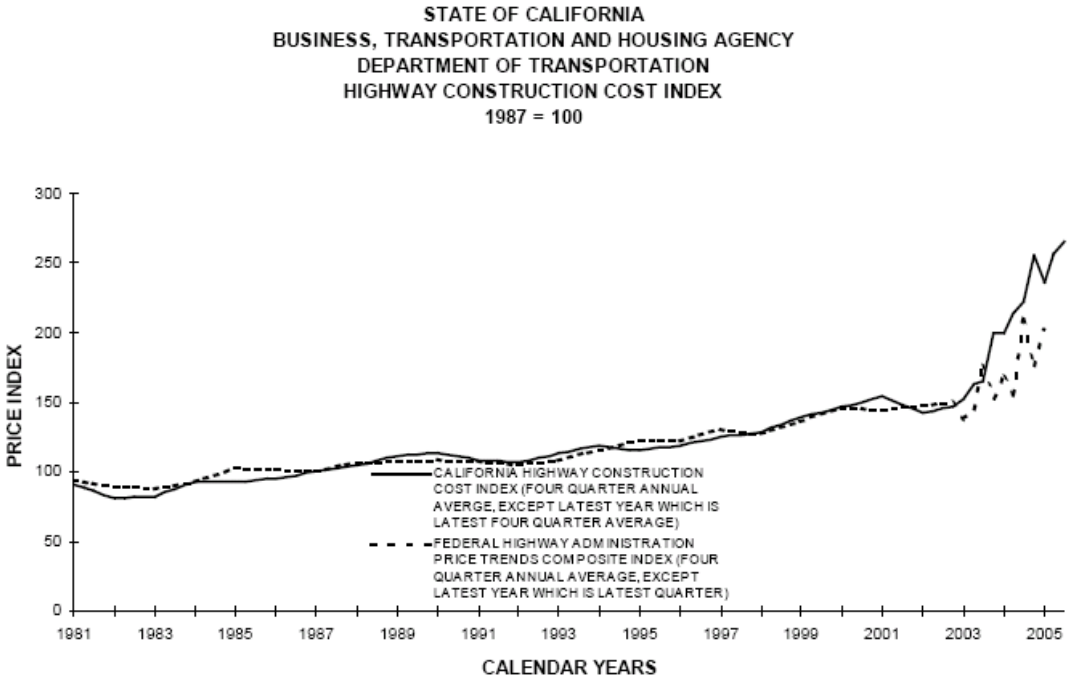
SYSTEM CONDITION AND OPERATIONAL DEMANDS:

The demands placed upon the transportation infrastructure continue to increase at a steady pace. In the decade between 1995 and 2005, annual Vehicle Miles Traveled (VMT) increased 20 percent. The increasing VMT combined with the age of the system is causing a faster rate of pavement and bridge deterioration, new accident concentration locations, and increasing hours of traffic congestion.

Beyond the needs for rehabilitation and reconstruction of the infrastructure caused by increasing travel and goods movement, needs are also increasing to comply with new laws and regulations related to storm water, ADA and hazardous waste remediation that were not in existence when the system was built. Compliance with new and evolving mandates requires an ever-increasing share of available SHOPP funding.

Consider the following. The 2005 SHOPP ten-year plan identified needed preservation and rehabilitation costs at $2.97 billion per year ($29.72 billion over the ten-year period). Funding in the adopted 2006 SHOPP averages $2.0 billion per year, which is only 67 percent of the identified need.

Furthermore, increasing construction costs reduce the buying power of the limited SHOPP resources. Highway construction costs increased at predictable and steady rates between 1980 and 2000. From 2003 to present, costs have escalated at rapid and unforeseen rates. Escalating construction costs further limit the ability of the SHOPP to effectively maintain and preserve the SHS.



As stated in the adopted 2006 FE, the State Highway Account (SHA), which is the sole funding source for the SHOPP, only funded a constrained 2006 SHOPP. One of the primary reasons why the SHA is not able to fully fund the SHOPP is because revenues, such as the State excise tax on gasoline and diesel fuels, have not kept up with the rising costs of highway construction and operation. The effect of a constrained SHOPP is the delay of needed preservation and rehabilitation work, leading to reduced operational performance of the SHS and higher costs when repairs are ultimately undertaken.

CHALLENGES AND OPPORTUNITIES:

The demands placed on the transportation infrastructure continue to increase at a steady rate. This continued increase in both VMT and goods movement on the SHS, combined with the age of the system, causes accelerated deterioration of pavement and bridges, and an increasing demand on supporting infrastructure. At the same time, funding available for the SHOPP is limited and the financial responsibilities as owner/operator of the transportation system continue to consume a larger amount of limited SHA resources. Further impacting those limited available resources is the increased cost of construction leading to reduced buying power. The SHOPP is also challenged by having limited resources and many different competing needs as captured in the various SHOPP categories. It is difficult to prioritize between all these competing demands.

These challenges make it extremely difficult for the SHOPP to achieve its stated purpose of maintaining and preserving the investment in the SHS. Potentially, several opportunities may provide some relief. These include:

- **Grant Anticipation Revenue Vehicle (GARVEE) Bonds.** Under State and federal law, the Commission may select some projects from the SHOPP to be funded from the proceeds of federal grant anticipation (GARVEE) bonds. This is a form of borrowing against future federal funding. Should GARVEE bonding be selected as a funding mechanism, the earliest that SHOPP GARVEE funding could be available is in the 2008-09 fiscal year.

- **Proposition 1B – The Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006**. Should Proposition 1B pass on November 7, 2006, the proposition would allocate $750 million to the rehabilitation and improvement of State highways and local roads. The potential funding available for State highways is $500 million.

- **New revenue stream** – Potential for new revenue streams may help to offset the needs of the SHOPP.

These opportunities will be presented and discussed in further detail at a future Commission meeting.

APPENDIX

DETAILED DESCRIPTION OF THE ELEMENTS IN EACH SHOPP CATEGORY

EMERGENCY RESPONSE CATEGORY:

Emergency response has two elements – Emergency Opening and Permanent Restoration.

Major Damage – Emergency Opening: The primary purpose of this element is to reopen facilities damaged or imminently threatened by natural disasters, catastrophes or events such as storms, floods, fires, earthquakes, tsunamis (tidal waves), or volcanic action. Responses to man-made disasters such as large scale civil unrest, explosions, and acts of war or terrorism are also included.

Typical activities are:

- emergency road openings to temporary or permanent levels of traffic;
- debris removal and demolition;
- construction or operation of detours;
- earthwork, blasting, or replacement of rock to protect facilities from additional damage or to remove an imminent threat; and
- drainage facilities needed to forestall immediate threat of additional washout or erosion replacement of traffic safety devices (such as guardrail, signals, etc.) when lost due to catastrophic damage.

It is expected that emergency opening projects restore the roadway to service within 180 days of the damage incident.

Typically, emergency opening projects are allocated under CTC Resolution G-11, authorizing the Department of Transportation (Department) to allocate funds for emergency projects.

Major Damage – Permanent Restoration: The primary purpose of this element is to restore facilities to their pre-damage condition after the emergency opening phase is complete. To be considered as permanent restoration, the project must be tied to an identifiable event. The typical scope for such projects may include:

- final grading and earthwork;
- full restoration of roadway and all appurtenances to pre-damage condition;
- construction of permanent geotechnical, structural and drainage fixtures; and
- new alignments when the existing damaged alignment is no longer feasible.

Depending on the timing and urgency of the restoration, permanent restoration may be programmed in the State Highway Operations and Protection Plan (SHOPP) and allocated either directly by the California Transportation Commission (Commission) or through Commission's G-11 resolution. It is expected permanent restoration projects achieve construction completion within three years of the damage incident.

COLLISION REDUCTION CATEGORY:

Collision reduction has three elements – Safety Improvements, Collision Severity Reduction, and Median Barrier Upgrade.

Safety Improvements: The primary purpose of this element is to reduce the number or severity of collisions on the existing State Highway System (SHS). Project identification is based on the calculation of a Safety Index (SI).

Projects may be spot locations where collision history indicates a pattern susceptible to correction by a safety improvement such as, but not limited to:

- traffic (school zone signals included);
- wet pavement corrections;
- curve corrections;
- shoulder widening; and
- left turn channelization.

Collision Severity Reduction: The primary purpose of this element is to upgrade existing highway safety features within the clear recovery area of the roadbed that will lead to reduced collisions and/or severity of collisions. Projects will include:

- installation of new guardrail end treatments and crash cushions;
- install rumble strips, glare screen, rock fall mitigation, over crossing pedestrian fencing; and
- Clean Up the Roadside Environment (CURE) projects. (CURE project goals are to remove, relocate, make breakaway, or shield objects within the clear recovery area.)

The intent of this program is to be proactive in enhancing the safety of the SHS. As such, this program will not be subject to an SI analysis, but rather will define numeric quantities that will be achieved for each of the categories of situations. Projects will be prioritized based on the projected collision severity reduction benefits.

Upgrade Median Barriers: The primary purpose of this element is to upgrade existing cable and metal barriers with concrete median barriers to minimize maintenance required to maintain these median barriers on high volume urban freeways. This will lead to reduced worker exposure. This element is intended for all freeways that have existing cable or double metal medium barrier in the median.

LEGAL AND REGULATORY MANDATES CATEGORY:

This category has five elements – Relinquishments, Railroad/Highway At-Grade Crossings, Hazardous Waste Mitigation, Storm Water Mitigation and Americans with Disabilities Act (ADA) Curb Ramps.

Relinquishments: The primary purpose of this element is to provide funding for Legislative Relinquishments of State highways to local agencies that are considered to be "in the best interest of the State."

Railroad/Highway At-Grade Crossing: The primary purpose of this element is to reduce the number and severity of highway accidents by eliminating hazards to vehicles and pedestrians at existing railroad crossings.

The program is authorized by Title 23, United States Code Section 130 (23 U.S.C.). The Section 130 program is a cooperative effort between the Federal Highway Administration (FHWA), the Department, the California Public Utilities Commission (CPUC), railroad companies and local agencies. All projects must be authorized by the CPUC pursuant to Section 1201 through 1220 of the Public Utilities Code.

Hazardous Waste Mitigation: The primary purpose of this element is to clean up hazardous waste contamination on a State highway and other Department-owned property when the site is not part of a programmed State Transportation Improvement Program (STIP), SHOPP, or Minor Project.

Storm Water Mitigation: The primary purpose of this element is to implement court ordered storm water mitigation projects on the SHS or for stand alone projects that are required for the Department to comply with National Pollutant Discharge Elimination System (NPDES) permits. It also includes projects that improve safety conditions, erosion control, water quality of storm water runoff, and drainage systems to minimize non-point pollution runoff into the Lake Tahoe Basin.

ADA Curb Ramps: The primary purpose of this program element is to construct curb ramps at existing cross walks, and other defined pedestrian pathways, to make the path of travel accessible. It should be noted that the Department's actions to upgrade facilities consistent with ADA requirements is not limited to this funding category. Compliance with ADA is incorporated into the Department's design standards.

BRIDGE PRESERVATION CATEGORY:

This category has six elements – Bridge Rehabilitation, Bridge Scour Mitigation, Bridge Rail Replacement and Upgrade, Bridge Seismic Restoration, Bridge Widening, and Transportation Permit Requirements for Bridges.

Bridge Rehabilitation: The primary purpose of this element is to restore or replace structures when, due to deterioration or other causes, they become inadequate. Emphasis is placed on structures classified as structurally deficient and/or functionally obsolete.

Included is work to meet standards as required under ADA and the California Occupation Safety and Health Administration (Cal/OSHA), and work required to restore or replace appurtenances attached to structures for use in maintenance, such as inspection walkways, movable scaffolds, and air and water service lines.

Major transportation structures include bridges, tunnels, tubes, drainage pumping plants, marine fenders, ferryboats, and the mechanical and electrical machinery associated therewith.

It is recognized that when bridges are replaced or rehabilitated it is sometimes appropriate to make some geometric and structural improvements. Therefore, approved improvements may be considered as part of a restoration or replacement project, but the original need for the project must have been to restore or replace structures.

Bridge Scour Mitigation: The primary purpose of this element is to rehabilitate or replace bridges when the prime purpose of the needed action is due to an identified scour critical situation.

This program may also include any monitoring projects that are necessary to collect data that will show when the bridge becomes scour critical and requires further action.

Bridge Rail Replacement and Upgrade: The primary purpose of this element is to bring all non-crashworthy bridge rails up to current federal standards. The program will identify the number and locations of non-crashworthy rails and develop an implementation plan to bring these rails to the current standards.

Bridge Seismic Restoration: The primary purpose of this element is to repair seismic deficiencies of existing bridges for those bridges not identified in the Seismic Retrofit Phase I Program.

Bridge Widening: The primary purpose of this element is to perform bridge widening that was deferred from other projects as part of a commitment to FHWA to receive funding for the original project.

Transportation Permit Requirements for Bridges: The primary purpose of this element is to upgrade low and weak bridges to allow safe and efficient movement of oversized/overweight vehicles and loads on major State highways.

ROADWAY PRESERVATION CATEGORY:

The goal of the roadway preservation category is to reduce the percentage of distressed lane-miles. The roadway preservation category has six elements – Roadway Rehabilitation, Pavement Rehabilitation, Long-Life Pavement Rehabilitation, Roadway Protective Betterments, Drainage System Restoration, and Signs and Lighting Rehabilitation.

The historic goal of the Department has been to reduce the number of distressed lane-miles of pavement to 5,500, or approximately 10 percent of the total system. Due to funding constraints, the Department is reevaluating this goal.

Roadway Rehabilitation: The primary purpose of this element is to rehabilitate roadways that ride rougher than established maximums and/or exhibit substantial structural problems. Work incidental to pavement rehabilitation or replacement of other highway appurtenances which are failing, worn out or functionally obsolete, such as drainage facilities, retaining walls, lighting, signal controllers, and fencing, may be included.

A roadway or appurtenance that is rehabilitated under this task should normally provide 10 years or more of service life with relatively low maintenance expenditures. Rehabilitation, with its provision of extending the service life of the facility, is distinct from maintenance, which simply repairs or preserves the facility in a safe and usable condition.

Roadway Rehabilitation projects must qualify for rehabilitation on the basis of existing Pavement Management System (PMS) criteria.

Pavement Rehabilitation: The primary purpose of this element is to provide corrective maintenance for pavement under the Capital Preventive Maintenance (CAPM) guidelines. This task may be used to correct pavement distress as an intermediate fix until the full roadway rehabilitation project may be delivered. The expected life of a CAPM project is five to seven years.

Pavement Rehabilitation projects must qualify on the basis of existing PMS guidelines. Traffic safety and other operational improvements will not be added to pavement preservation work. Other work (geometric corrections, widening, etc.) is typically not added to a Pavement Rehabilitation project.

Long-Life Pavement Rehabilitation: The primary purpose of this element is to implement Long-Life Pavement Rehabilitation corridors on roadways where the average daily traffic is greater than 150,000 vehicles and 50,000 average daily truck traffic.

Long-Life Pavement Rehabilitation has its provision of extending the service life of the pavement to at least twice the normal rehabilitation project and will upgrade the existing corridor to current federal standards. Other roadway improvements, such as signing and lighting upgrades, and traffic safety and operational improvements, may be added to this work if justified by accident statistics or are required by federal standards to qualify the project for federal funding. The expected life of a long-life pavement project is 20 to 40 years.

Roadway Protective Betterments: The primary purpose of this element is to protect facilities from anticipated future catastrophic damage from natural events (storms, floods, landslides, etc.) or human-caused events.

Examples of protective betterments include:

- rock slope protection;
- rock fall prevention (rock nets, etc.);
- stabilization trenches;
- slope corrections;
- pumps, pumping stations at depressed sections;
- retaining walls, soil nailing; and
- security improvements (capital improvements only).

Drainage System Restoration: The primary purpose of this element is to provide for the replacement or in-place rehabilitation of culverts and highway drainage systems which have lost serviceability due to age, wear or degradation. Upgrades or modifications of culverts and highway drainage systems to increase flow or improve drainage alignment are included. Projects to abandon culverts are also included.

Signs and Lighting Rehabilitation: The primary purpose of this element is to rehabilitate and upgrade signs and lighting facilities.

MOBILITY IMPROVEMENT CATEGORY:

The mobility improvement category has three elements – Operational Improvements, Transportation Management Systems Weigh Stations, and Weigh-in-Motion Facilities.

Operational Improvements: The primary purpose of this program element is to improve traffic flow on existing State highways by reducing congestion and operational deficiencies at spot locations. As stated in Section 13 of the adopted 2006 STIP Guidelines, State highway operational improvements that do not expand the design capacity of the system and are intended to address spot congestion are eligible for SHOPP. Regions may nominate these types of projects in their RTIP if timely implementation through the SHOPP is not possible.

Operational improvement projects do not expand the design capacity of the system. Examples of Operational Improvement projects include, but are not limited to:

- interchange modifications (but not to accommodate traffic volumes that are significantly larger than the existing facilities were designed for);
- ramp modifications (acceleration - deceleration/weaving);
- auxiliary lanes for merging or weaving between adjacent interchanges;
- curve corrections/improve alignment;
- signals and/or intersection improvements;
- two-way left-turn lanes;
- channelization;
- turnouts; and
- shoulder widening.

Transportation Management Systems: The primary purpose of this element is to improve traffic flow on existing State highways by addressing system-wide non-recurrent congestion through system management techniques.

Transportation Management Systems facilitate the real time management of the State highway system by providing accident and incident detection, verification, response, and clearance. These systems provide State highway system status information to travelers.

Examples of Transportation Management System projects include, but are not limited to:

- traffic sensors;
- changeable message signs;
- close circuit television cameras;
- ramp meters;
- communications systems;
- highway advisory radio;
- traffic signal interconnect projects; and
- Transportation Management Centers (TMCs), including the necessary computer software and hardware

Weigh Stations & Weigh-in-Motion Facilities: The primary purpose of this element is to provide for Commercial Vehicle Enforcement Facilities (commonly called weigh stations) and Weigh-in-Motion (WIM) systems.

The weigh stations are needed to support the Commercial Vehicle Enforcement Plan. Truck safety, size and weight regulations are enforced by the California Highway Patrol, reducing truck related accidents or incidents, and protecting our highways from premature damage.

The WIM sites provide data for federally required data systems and special studies, design and maintenance strategies, size and weight policies, enforcement and planning strategies, and the traffic and truck volumes publications.

ROADSIDE IMPROVEMENT CATEGORY:

The roadside improvement category has six elements – Highway Planting Restoration, Freeway Maintenance Access, Roadside Enhancement, Beautification and Modernization, Safety Roadside Rest Area Restoration, and New Safety Roadside Rest Areas.

Highway Planting Restoration: The primary purpose of this element is to provide for replacement planting restoration and to rehabilitate existing highway plantings to an economically maintainable state following damage by weather, natural violence or deterioration.

Highway planting restoration projects also provide for erosion control to comply with National Pollution Discharge Elimination System (NPEDS) permit requirements, provide design for safety features for maintenance workers, improve roadside appearance and coordination with community character.

Freeway Maintenance Access: The primary purpose of this element is to provide improved off pavement access to work sites to minimize the exposure of highway workers to traffic.

Roadside Enhancement: The primary purpose of this program element is to provide for:

- fish and wildlife preservation and protection;
- historical markers;
- information systems such as logo signs;
- eliminate qualifying junkyards;
- removal of nonconforming outdoor advertising signs;
- roadside ecological viewing areas;
- scenic enhancements;
- compliance with Surface Mining and Reclamation Act of 1975 requirements;
- vista points; and
- relinquishment of environmental mitigation sites.

Safety Roadside Rest Area Restoration: The primary purpose of this element is to correct deficiencies and restore existing roadside rest areas to a safe and healthful condition, and is intended to:

- improve operations;
- expand capacity (parking and-comfort stations);
- rehabilitate or replace existing comfort stations or other architectural elements;
- add maintenance facilities and office space for California Highway Patrol;
- upgrade sewage systems , water supply, or electrical systems to meet health and safety codes and the ADA and Cal-OSHA requirements; and
- upgrade ramps to new design standards or relocate existing rest areas to another location or construct auxiliary facilities where expansion and upgrading at an existing site is not feasible are included.

New Safety Roadside Rest Areas: The primary purpose of this element is to provide for new, conveniently spaced safety roadside rest areas, as an integral part of the SHS, where the traveler may stop, rest, relax, obtain travel information, and return to the highway more alert and safe.

Partnerships and joint development of rest areas with the private sector or public agencies are included.

All land, structures, landscaping, utilities and other facilities; e.g., restrooms, office and storage space, tables, drinking fountains, telephones, motorist information, trash receptacles, trailer sanitary stations, are included.

FACILITY IMPROVEMENT CATEGORY:

The goal of the facility improvement category is to address worker safety, ADA and Cal-OSHA requirements, and to improve operational efficiency. The facility improvement category has four elements – Equipment Facilities, Maintenance Facilities, Office Buildings, and Materials Laboratories.